CLAIMS

1. Recombinant allergen, characterised in that it is a non-naturally occurring mutant derived from a naturally occurring allergen, wherein at least one surface-exposed, conserved amino acid residue of a B cell epitope is substituted by another residue which does not occur in the same position in the amino acid sequence of any known homologous protein within the taxonomic order from which said naturally occurring allergen originates, said mutant allergen having essentially the same α-carbon backbone tertiary structure as said naturally occurring allergen, and the specific IgE binding to the mutated allergen being reduced as compared to the binding to said naturally occurring allergen.

2. Recombinant allergen according to claim 1, characterised in that it is obtainable by

a) identifying amino acid residues in a naturally occurring allergen which are conserved with more than 70% identity in all known homologous proteins within the taxonomic order from which said naturally occurring allergen originates;

b) defining at least one patch of conserved amino acid residues being coherently connected over at least 400 Å$^2$ of the surface of the three-dimensional structure of the allergen molecule as defined by having a solvent accessibility of at least 20 %, said at least one patch comprising at least one B cell epitope; and

c) substituting at least one amino acid residue in said at least one patch by another amino acid being non-conservative in the particular position while essentially preserving the overall α-carbon backbone tertiary

structure of the allergen molecule.

3. Recombinant allergen according to claim 1 ~~or 2,~~ characterised in that the specific IgE binding to the mutated allergen is reduced by at least 5%, preferably at least 10%.

4. Recombinant allergen according to ~~any of claims 1-3,~~ Claim 1 characterised in that when comparing the α-carbon backbone tertiary structures of the mutant and the naturally occurring allergen molecules, the average root mean square deviation of the atomic coordinates is below 2Å.

5. Recombinant allergen according to claim 2, characterised in that said at least one patch comprises 1-4 atoms of 15-25 amino acid residues.

6. Recombinant allergen according to ~~any one of claims 2-5,~~ Claim 2 characterised in that the amino acid residues of said at least one patch are ranked with respect to solvent accessibility, and one or more amino acids among the more solvent accessible ones are substituted.

7. Recombinant allergen according to claim 6, characterised in that one or more amino acid residues of said at least one patch having a solvent accessibility of 20-80 % are substituted.

8. Recombinant allergen according to ~~any one of claims 2-7,~~ Claim 2 characterised in that 1-5 amino acid residues per 400 Å$^2$ in said at least one patch are substituted.

9. Recombinant allergen according to ~~any one of claims 2-5,~~ Claim 2 characterised in that the substitution of one or more amino acid residues in said B cell epitope or said

at least one patch is carried out by site-directed mutagenesis.

10. Recombinant allergen according to ~~any one of claims 1-9~~ Claim 1, characterised in that it is derived from an inhalation allergen.

11. Recombinant allergen according to claim 10, characterised in that it is derived from a pollen allergen.

12. Recombinant allergen according to claim 10, characterised in that it is derived from a pollen allergen originating from the taxonomic order of *Fagales*, *Oleales* or *Pinales*.

13. Recombinant allergen according to claim 12, characterised in that it is derived from *Bet v* 1.

14. Recombinant allergen according to claim 13, characterised in that at least one amino acid residue of said B cell epitope or said at least one patch is substituted.

15. Recombinant allergen according to claim 14, characterised in that the substitution(s) is (are) Thr10Pro, Asp25Gly, (Asn28Thr + Lys32Gln), Glu45Ser, Asn47Ser, Lys55Asn, Thr77Ala, Pro108Gly or (Asn28Thr, Lys32Gln, Glu45Ser, Pro108Gly.

16. Recombinant allergen according to claim 11, characterised in that it is derived from a pollen allergen originating from the taxonomic order of *Poales*.

17. Recombinant allergen according to claim 11, characterised in that it is derived from a pollen

allergen originating from the taxonomic order of *Asterales* or *Urticales*.

18. Recombinant allergen according to claim 10, characterised in that it is derived from a house dust mite allergen.

19. Recombinant allergen according to claim 18, characterised in that it is derived from a mite allergen originating from *Dermatophagoides*.

20. Recombinant allergen according to claim 10, characterised in that it is derived from a cockroach allergen.

21. Recombinant allergen according to claim 10, characterised in that it is derived from an animal allergen.

22. Recombinant allergen according to claim 21, characterised in that it is derived from an animal allergen originating from cat, dog or horse.

23. Recombinant allergen according to ~~any one of claims 1-9,~~ Claim 1 characterised in that it is derived from a venom allergen.

24. Recombinant allergen according to claim 23, characterised in that it is derived from a venom allergen originating from the taxonomic order of *Hymenoptera*.

25. Recombinant allergen according to claim 24, characterised in that is derived from a venom allergen from the taxonomic order of Vespidae, Apidae and Formicoidae.

26. Recombinant allergen according to ~~any one of claims 23-25~~ claim 23, characterised in that it is derived from *Ves v* 5.

27. Recombinant allergen according to ~~any one of claims 23-26~~ claim 23, characterised in that at least one amino acid is substituted.

28. Recombinant allergen according to ~~any one of claims 25-27~~ claim 25, characterised in that the substitution is Lys72Ala or Tyr96Ala.

29. A method of preparing a recombinant allergen according to ~~any one of claims 1-29~~ claim 1, characterised by

a) identifying amino acid residues in a naturally occurring allergen which are conserved with more than 70% identity in all known homologous proteins within the taxonomic order from which said naturally occurring allergen originates;

b) defining at least one patch of conserved amino acid residues being coherently connected over at least 400 Å$^2$ of the surface of three-dimensional structure of the allergen molecule as defined by having a solvent accessibility of at least 20%, said at least one patch comprising at least one B cell epitope; and

c) substituting at least one amino acid residue in said at least one patch by another amino acid being non-conservative in the particular position while essentially preserving the overall α-carbon backbone tertiary structure of the allergen molecule.

30. A method according to claim 29, characterised by ranking the amino acid residues of said at least one patch with respect to solvent accessibility and

substituting one or more amino acids among the more solvent accessible ones.

31. A method according to claim 29 ~~or 30,~~ characterised in that the substitution of one or more amino acid residues in said B cell epitope or said at least one patch is carried out by site-directed mutagenesis.

32. Recombinant allergen according to ~~any of claims 1-28~~ claim 1 for use as a pharmaceutical.

33. Pharmaceutical composition, characterised in that it comprises a recombinant allergen according to ~~any one of claims 1-28~~ claim 1, optionally in combination with a pharmaceutically acceptable carrier and/or excipient, and optionally an adjuvant.

34. A pharmaceutical composition according to claim 33, characterised in that it is in the form of a vaccine against allergic reactions elicited by a naturally occurring allergen in patients suffering from allergy.

35. Method of generating an immune response in a subject comprising administering to the subject at least one recombinant allergen according to any one of claims 1-28 or a pharmaceutical composition according to any one of claims 33-34.

36. Process for preparing a pharmaceutical composition according to any one of claims 33-34 comprising mixing at least one recombinant allergen according to any one of claims 1-28 with pharmaceutically acceptable substances and/or excipients.

37. Vaccination or treatment of a subject comprising administering to the subject at least one recombinant

allergen according to any one of claims 1-28 or a pharmaceutical composition according to any one of claims 33-34.

38. Pharmaceutical composition obtainable by the process according to claim 36.

39. Method for the treatment, prevention or alleviation of allergic reactions comprising administering to a subject a recombinant allergen according to any one of claims 1-28 or a pharmaceutical composition according to any one of claims 33-34 or 38.